transpired during camp should be discussed with the family when the camper is picked up.

A formal relationship with a nearby medical facility should be secured for each camp so that camp medical staff have the ability to refer to this facility for prompt treatment of medical emergencies. It is imperative that the medical staff is led by someone with expertise in managing type 1 and type 2 diabetes. Nursing staff should include diabetes educators and diabetes clinical nurse specialists. Registered dietitians with expertise in diabetes should also have input into the design of the menu and the education program. All camp staff, including medical, nursing, nutrition, and volunteer, should undergo background testing to ensure appropriateness in working with children.

D. Diabetes management in correctional institutions (232)

Recommendations

- Patients with a diagnosis of diabetes should have a complete medical history and undergo an intake physical examination by a licensed health professional in a timely manner. (E)
- Insulin-treated patients should have a capillary blood glucose (CBG) determination within 1–2 h of arrival. (E)
- Medications and MNT should be continued without interruption upon entry into the correctional environment. (E)
- Correctional staff should be trained in the recognition, treatment, and appropriate referral for hypo- and hyperglycemia. (E)
- Train staff to recognize symptoms and signs of serious metabolic decompensation and to immediately refer the patient for appropriate medical care. (E)
- Institutions should implement a policy requiring staff to notify a physician of all CBG results outside of a specified range, as determined by the treating physician. (E)
- Identify patients with type 1 diabetes who are at high risk for DKA. (E)
- In the correctional setting, policies and procedures need to be developed and implemented to enable CBG monitoring to occur at the frequency necessitated by the individual patient's glycemic control and diabetes regimen. (E)
- Include diabetes in correctional staff education programs. (E)
- For all interinstitutional transfers, complete a medical transfer summary to be transferred with the patient. (E)
- Diabetes supplies and medication should accompany the patient during transfer. (E)
- Begin discharge planning with adequate lead time to insure continuity of care and facilitate entry into community diabetes care. (E)

At any given time, >2 million people are incarcerated in prisons and jails in the U.S. It is estimated that nearly 80,000 of these inmates have diabetes. In addition, many more people with diabetes pass through the corrections system in a given year.

People with diabetes in correctional facilities should receive care that meets national standards. Correctional institutions have unique circumstances that need to be considered so that all standards of care may be achieved. Correctional institutions should have written policies and procedures for the

management of diabetes and for training of medical and correctional staff in diabetes care practices.

Reception screening should emphasize patient safety. In particular, rapid identification of all insulin-treated individuals with diabetes is essential in order to identify those at highest risk for hypo- and hyperglycemia and DKA. All insulin-treated patients should have a CBG determination within 1–2 h of arrival. Patients with a diagnosis of diabetes should have a complete medical history and physical examination by a licensed health care provider with prescriptive authority in a timely manner. It is essential that medication and MNT be continued without interruption upon entry into the correctional system, as a hiatus in either medication or appropriate nutrition may lead to either severe hypo- or hyperglycemia.

All patients must have access to prompt treatment of hypo- and hyperglycemia. Correctional staff should be trained in the recognition and treatment of hypo- and hyperglycemia, and appropriate staff should be trained to administer glucagon. Institutions should implement a policy requiring staff to notify a physician of all CBG results outside of a specified range, as determined by the treating physician.

Correctional institutions should have systems in place to ensure that insulin administration and meals are coordinated to prevent hypo- and hyperglycemia, taking into consideration the transport of residents off site and the possibility of emergency schedule changes.

Monitoring of CBG is a strategy that allows caregivers and people with diabetes to evaluate diabetes management regimens. The frequency of monitoring will vary by patients' glycemic control and diabetes regimens. Policies and procedures should be implemented to ensure that the health care staff has adequate knowledge and skills to direct the management and education of individuals with diabetes.

Patients in jails may be housed for a short period of time before being transferred or released, and it is not unusual for patients in prison to be transferred within the system several times during their incarceration. Transferring a patient with diabetes from one correctional facility to another requires a coordinated effort as does planning for discharge.

E. Emergency and disaster preparedness

People with diabetes should always be prepared for emergencies whether natural or otherwise, affecting the nation/state or just them and their families. Such preparedness will lessen the impact an emergency may have on their condition. It is recommended that people with diabetes keep a waterproof and insulated disaster kit ready with items critically important to their self-management. These include glucose testing strips, lancets, and a glucose-testing meter; medications including insulin in a cool bag; syringes; glucose tabs or gels; antibiotic ointments/creams for external use; and glucagon emergency kits. In addition, it may be important to carry a list of contacts for national organizations, such as the ADA, through their help lines or the Internet, and photocopies of relevant medical information, particularly medication lists, and recent lab tests/procedures if available. If possible, prescription numbers should be noted, since many chain pharmacies throughout the country may be able to refill medications based on the prescription number alone. This disaster kit should be reviewed and replenished at least twice yearly.

IX. HYPOGLYCEMIA AND EMPLOYMENT/LICENSURE

Recommendations

- People with diabetes should be individually considered for employment based on the requirements of the specific job and the individual's medical condition, treatment regimen, and medical history. (E)

Any person with diabetes, whether insulin treated or non–insulin treated, should be eligible for any employment for which he/she is otherwise qualified. Despite the significant medical and technological advances made in managing diabetes, discrimination in employment and licensure against people with diabetes still occurs. This discrimination is often based on apprehension that the person with diabetes may present a safety risk to the employer or the public, a fear sometimes based on misinformation or lack of up-to-date knowledge about diabetes. Perhaps the greatest concern is that hypoglycemia will cause sudden unexpected incapacitation. However, most people with diabetes can manage their condition in such a manner that there is minimal risk of incapacitation from hypoglycemia.

Because the effects of diabetes are unique to each individual, it is inappropriate to consider all people with diabetes the same. People with diabetes should be individually considered for employment based on the requirements of the specific job. Factors to be weighed in this decision include the individual's medical condition, treatment regimen (MNT, oral glucose-lowering agent, and/or insulin), and medical history, particularly in regard to the occurrence of incapacitating hypoglycemic episodes.

X. THIRD-PARTY REIMBURSEMENT FOR DIABETES CARE, SELF-MANAGEMENT EDUCATION, AND SUPPLIES (233)

Recommendations

- Patients and practitioners should have access to all classes of antidiabetic medications,

equipment, and supplies without undue controls. (E)
- MNT and DSME should be covered by insurance and other payors. (E)

To achieve optimal glucose control, the person with diabetes must be able to access health care providers who have expertise in the field of diabetes. Treatments and therapies that improve glycemic control and reduce the complications of diabetes will also significantly reduce health care costs. Access to the integral components of diabetes care, such as health care visits, diabetes supplies and medications, and self-management education, is essential. All medications and supplies, such as syringes, strips, and meters, related to the daily care of diabetes must also be reimbursed by third-party payors.

It is recognized that the use of formularies, prior authorization, and related provisions, such as competitive bidding, can manage provider practices as well as costs to the potential benefit of payors and patients. However, any controls should ensure that all classes of antidiabetic agents with unique mechanisms of action and all classes of equipment and supplies designed for use with such equipment are available to facilitate achieving glycemic goals and to reduce the risk of complications. To reach diabetes treatment goals, practitioners should have access to all classes of antidiabetic medications, equipment, and supplies without undue controls. Without appropriate safeguards, these controls could constitute an obstruction of effective care.

Medicare and many other third-party payors cover DSME (diabetes self-management training [DSMT]) and MNT. The qualified beneficiary, who meets the diagnostic criteria and medical necessity, can receive an initial benefit of 10 h of DSMT and 3 h of MNT with a potential total of 13 h of initial education as long as the services are not provided on the same date. However, not all Medicare beneficiaries with a diagnosis of diabetes will qualify for both MNT and DSMT benefits. More information on Medicare policy, including follow-up benefits, is available at www.diabetes.org/for-health-professionals-and-scientists/recognition.jsp. Or visit CMS websites: DSME, www.cms.hhs.gov/DiabetesSelfManagement; and diabetes MNT, www.cms.hhs.gov/MedicalNutritionTherapy reimbursement.

▶ XI. STRATEGIES FOR IMPROVING DIABETES CARE

The implementation of the standards of care for diabetes has been suboptimal in most clinical settings. A recent report (26) indicated that only 37% of adults

with diagnosed diabetes achieved an A1C of <7%, only 36% had a blood pressure <130/80 mmHg, and just 48% had a cholesterol <200 mg/dl. Most distressing was that only 7.3% of diabetes subjects achieved all three treatment goals.

While numerous interventions to improve adherence to the recommended standards have been implemented, the challenge of providing uniformly effective diabetes care has thus far defied a simple solution. A major contributor to suboptimal care is a delivery system that too often is fragmented, lacks clinical information capabilities, often duplicates services, and is poorly designed for the delivery of chronic care. The Institute of Medicine has called for changes so that delivery systems provide care that is evidence based, patient centered, and systems oriented and takes advantage of information technologies that foster continuous quality improvement. Collaborative, multidisciplinary teams should be best suited to provide such care for people with chronic conditions like diabetes and to empower patients' performance of appropriate self-management. Alterations in reimbursement that reward the provision of quality care, as defined by the attainment of quality measures developed by such activities as the ADA/National Committee for Quality Assurance Diabetes Provider Recognition Program will also be required to achieve desired outcome goals.

The NDEP recently launched a new online resource to help health care professionals better organize their diabetes care. The www.betterdiabetescare.nih.gov website should help users design and implement more effective health care delivery systems for those with diabetes.

In recent years, numerous health care organizations, ranging from large health care systems such as the U.S. Veteran's Administration to small private practices, have implemented strategies to improve diabetes care. Successful programs have published results showing improvement in important outcomes such as A1C measurements and blood pressure and lipid determinations as well as process measures such as provision of eye exams. Successful interventions have been focused at the level of health care professionals, delivery systems, and patients. Features of successful programs reported in the literature include:

- Improving health care professional education regarding the standards of care through formal and informal education programs.
- Delivery of DSME, which has been shown to increase adherence to standard of care.
- Adoption of practice guidelines, with participation of health care professionals in the process. Guidelines should be readily accessible at the point of service, such as on patient charts, in examining rooms, in "wallet or pocket cards," on PDAs, or on office computer systems.

Guidelines should begin with a summary of their major recommendations instructing health care professionals what to do and how to do it.

- Use of checklists that mirror guidelines have been successful at improving adherence to standards of care.
- Systems changes, such as provision of automated reminders to health care professionals and patients, reporting of process and outcome data to providers, and especially identification of patients at risk because of failure to achieve target values or a lack of reported values.
- Quality improvement programs combining continuous quality improvement or other cycles of analysis and intervention with provider performance data.
- Practice changes, such as clustering of dedicated diabetes visits into specific times within a primary care practice schedule and/or visits with multiple health care professionals on a single day and group visits.
- Tracking systems with either an electronic medical record or patient registry have been helpful at increasing adherence to standards of care by prospectively identifying those requiring assessments and/or treatment modifications. They likely could have greater efficacy if they suggested specific therapeutic interventions to be considered for a particular patient at a particular point in time (234).
- A variety of nonautomated systems, such as mailing reminders to patients, chart stickers, and flow sheets, have been useful to prompt both providers and patients.
- Availability of case or (preferably) care management services, usually by a nurse. Nurses, pharmacists, and other nonphysician health care professionals using detailed algorithms working under the supervision of physicians and/or nurse education calls have also been helpful. Similarly dietitians using MNT guidelines have been demonstrated to improve glycemic control.
- Availability and involvement of expert consultants, such as endocrinologists and diabetes educators.

Evidence suggests that these individual initiatives work best when provided as components of a multifactorial intervention. Therefore, it is difficult to assess the contribution of each component; however, it is clear that optimal diabetes management requires an organized, systematic approach and involvement of a coordinated team of health care professionals.

Footnotes

The recommendations in this article are based on the evidence reviewed in the following publication: Standards of care for diabetes (Technical Review). *Diabetes Care* 17:1514–1522, 1994.

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References

▲ TOP

1. Bode BW (Ed.):*Medical Management of Type 1 Diabetes.* Alexandria, VA, American Diabetes Association, 2004
2. Bur ant CF (Ed.):*Medical Management of Type 2 Diabetes.* Alexandria, VA, American Diabetes Association, 2004
3. Kli ngensmith GJ (Ed.): *Intensive Diabetes Management.* Alexandria, VA, American Diabetes Association, 2003
4. Ex pert Committee on the Diagnosis and Classification of Diabetes Mellitus: Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 20:1183–1197, 1997[Medline]
5. Ex pert Committee on the Diagnosis and Classification of Diabetes Mellitus: Follow-up report on the diagnosis of diabetes mellitus. *Diabetes Care* 26:3160–3167, 2003 [Free Full Text]
6. Eng elgau MM, Narayan KM, Herman WH: Screening for type 2 diabetes. *Diabetes Care* 23:1563–1580, 2000[Abstract]
7. Gabir MM, Ha nson RL, Dabelea D, Imperatore G, Roumain J, Bennett PH, Knowler WC: The 1997 American Diabetes Association and 1999 World Health Organization criteria for hyperglycemia in the diagnosis and prediction of diabetes. *Diabetes Care* 23:1108–1112, 2000[Abstract/Free Full Text]
8. Knowler WC, Ba rrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA, Nathan DM: Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 346:393–403, 2002[Abstract/Free Full Text]
9. Tuom ilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, Keinanen-Kiukaanniemi S, Laakso M, Louheranta A, Rastas M, Salminen V, Uusitupa M: Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 344:1343–1350, 2001[Abstract/Free Full Text]
10. Pan XR, Li GW, Hu YH, Wang JX, Yang WY, An ZX, Hu ZX, Lin J, Xiao JZ, Cao HB, Liu PA, Jiang XG, Jiang YY, Wang JP, Zheng H, Zhang H, Bennett PH, Howard BV: Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance: the Da Qing IGT and Diabetes Study. *Diabetes Care* 20:537–544, 1997[Abstract]
11. American Diabetes Association: Type 2 diabetes in children and adolescents (Consensus Statement). *Diabetes Care* 23:381–389, 2000[Medline]
12. Harris R, Donahue K, Rathore SS, Frame P, Woolf SH, Lohr KN: Screening adults for type 2 diabetes: a review of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med* 138:215–229, 2003[Abstract/Free Full Text]
13. US Preventive Services Task Force: Screening for type 2 diabetes mellitus in adults: recommendations and rationale. *Ann Intern Med* 138:212–214, 2003[Abstract/Free Full Text]
14. American Diabetes Association: Gestational diabetes mellitus (Position Statement). *Diabetes Care* 27 (Suppl. 1):S88–S90, 2004
15. Buchanan TA, Xiang AH, Peters RK, Kjos SL, Marroquin A, Goico J, Ochoa C, Tan S, Berkowitz K, Hodis HN, Azen SP: Preservation of pancreatic beta-cell function and prevention of type 2 diabetes by pharmacological treatment of insulin resistance in high-risk Hispanic women. *Diabetes* 51:2796–2803, 2002[Abstract/Free Full Text]

16. Chiasson JL, Josse RG, Gomis R, Hanefeld M, Karasik A, Laakso M: Acarbose for prevention of type 2 diabetes mellitus: the STOP-NIDDM randomised trial. *Lancet* 359:2072–2077, 2002 [Medline]
17. Ramachandran A, Snehalatha C, Mary S, Mukesh B, Bhaskar AD, Vijay V: The Indian Diabetes Prevention Programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1). *Diabetologia* 49:289–297, 2006 [Medline]
18. Gerstein HC, Yusuf S, Bosch J, Pogue J, Sheridan P, Dinccag N, Hanefeld M, Hoogwerf B, Laakso M, Mohan V, Shaw J, Zinman B, Holman RR: Effect of rosiglitazone on the frequency of diabetes in patients with impaired glucose tolerance or impaired fasting glucose: a randomised controlled trial. *Lancet* 368:1096–1105, 2006[Medline]
19. American Diabetes Association: Consensus statement on self-monitoring of blood glucose. *Diabetes Care* 10:95–99, 1987[Medline]
20. American Diabetes Asociation: Self-monitoring of blood glucose. *Diabetes Care* 17:81–86, 1994 [Medline]
21. Welschen LM, Bloemendal E, Nijpels G, Dekker JM, Heine RJ, Stalman WA, Bouter LM: Self-monitoring of blood glucose in patients with type 2 diabetes who are not using insulin: a systematic review. *Diabetes Care* 28:1510–1517, 2005[Free Full Text]
22. Sacks DB, Bruns DE, Goldstein DE, Maclaren NK, McDonald JM, Parrott M: Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus. *Clin Chem* 48:436–472, 2002[Abstract/Free Full Text]
23. Cagliero E, Levina EV, Nathan DM: Immediate feedback of HbA_{1c} levels improves glycemic control in type 1 and insulin-treated type 2 diabetic patients. *Diabetes Care* 22:1785–1789, 1999 [Abstract/Free Full Text]
24. Miller CD, Barnes CS, Phillips LS, Ziemer DC, Gallina DL, Cook CB, Maryman SD, El Kebbi IM: Rapid A1c availability improves clinical decision-making in an urban primary care clinic. *Diabetes Care* 26:1158–1163, 2003[Abstract/Free Full Text]
25. Rohlfing CL, Wiedmeyer HM, Little RR, England JD, Tennill A, Goldstein DE: Defining the relationship between plasma glucose and HbA_{1c}: analysis of glucose profiles and HbA_{1c} in the Diabetes Control and Complications Trial. *Diabetes Care* 25:275–278, 2002 [Abstract/Free Full Text]
26. Saydah SH, Fradkin J, Cowie CC: Poor control of risk factors for vascular disease among adults with previously diagnosed diabetes. *JAMA* 291:335–342, 2004[Abstract/Free Full Text]
27. The Diabetes Control and Complications Trial Research Group: The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 329:977–986, 1993[Abstract/Free Full Text]
28. Nathan DM, Cleary PA, Backlund JY, Genuth SM, Lachin JM, Orchard TJ, Raskin P, Zinman B: Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. *N Engl J Med* 353:2643–2653, 2005[Abstract/Free Full Text]
29. The Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications Research Group: Retinopathy and nephropathy in patients with type 1 diabetes four years after a trial of intensive therapy. *N Engl J Med* 342:381–389, 2000 [Abstract/Free Full Text]
30. Cefalu WT: Glycemic control and cardiovascular disease: should we reassess clinical goals? *N Engl J Med* 353:2707–2709, 2005[Free Full Text]
31. Lawson ML, Gerstein HC, Tsui E, Zinman B: Effect of intensive therapy on early macrovascular disease in young individuals with type 1 diabetes: a systematic review and meta-analysis. *Diabetes Care* 22 (Suppl. 2):B35–B39, 1999
32. UKPDS: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33).

UK Prospective Diabetes Study (UKPDS) Group. *Lancet* 352:837–853, 1998[Medline]
33. UK Prospective Diabetes Study (UKPDS) Group: Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes (UKPDS 34). *Lancet* 352:854–865, 1998[Medline]
34. Stratton IM, Adler AI, Neil HA, Matthews DR, Manley SE, Cull CA, Hadden D, Turner RC, Holman RR: Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. *BMJ* 321:405–412, 2000 [Abstract/Free Full Text]
35. Selvin E, Marinopoulos S, Berkenblit G, Rami T, Brancati FL, Powe NR, Golden SH: Meta-analysis: glycosylated hemoglobin and cardiovascular disease in diabetes mellitus. *Ann Intern Med* 141:421–431, 2004[Abstract/Free Full Text]
36. American Diabetes Association: Postprandial blood glucose (Consensus Statement). *Diabetes Care* 24:775–778, 2001[Free Full Text]
37. Metzger BE, Coustan DR: Summary and recommendations of the Fourth International Workshop-Conference on Gestational Diabetes Mellitus: the Organizing Committee. *Diabetes Care* 21 (Suppl. 2):B161–B167, 1998
38. Jovanovic-Peterson L. (Ed.): *Medical Management of Pregnancy Complicated by Diabetes.* 3rd ed. Alexandria, VA, American Diabetes Association, 2000
39. Nathan DM, Buse JB, Davidson MB, Heine RJ, Holman RR, Sherwin R, Zinman B: Management of hyperglycemia in type 2 diabetes: a consensus algorithm for the initiation and adjustment of therapy: a consensus statement from the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care* 29:1963–1972, 2006[Free Full Text]
40. DeWitt DE, Hirsch IB: Outpatient insulin therapy in type 1 and type 2 diabetes mellitus: scientific review. *JAMA* 289:2254–2264, 2003[Abstract/Free Full Text]
41. Mooradian AD, Bernbaum M, Albert SG: Narrative review: a rational approach to starting insulin therapy. *Ann Intern Med* 145:125–134, 2006[Abstract/Free Full Text]
42. Bantle JP, Wylie-Rosett J, Albright AL, Apovian CM, Clark NG, Franz MJ, Hoogwerf BJ, Lichtenstein AH, Mayer-Davis E, Mooradian AD, Wheeler ML: Nutrition recommendations and interventions for diabetes–2006: a position statement of the American Diabetes Association. *Diabetes Care* 29:2140–2157, 2006[Free Full Text]
43. U.S. Department of Health and Human Services, U.S. Department of Agriculture: *Dietary Guidelines for Americans.* Washington, DC, U.S. Government Printing Office, 2005
44. Institute of Medicine: *Dietary Reference Intakes: Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids.* Washington, D.C., National Academies Press, 2002
45. Piette JD, Glasgow RE: Strategies for improving behavioral and health outcomes among people with diabetes: self managemnt education. In *Evidence-Based Diabetes Care.* Gerstein HC, Hayes RB, Eds. Ontario, Canada, BC Decker, 2000
46. Norris SL, Engelgau MM, Narayan KM: Effectiveness of self-management training in type 2 diabetes: a systematic review of randomized controlled trials. *Diabetes Care* 24:561–587, 2001 [Abstract/Free Full Text]
47. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM: Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. *Diabetes Care* 25:1159–1171, 2002[Abstract/Free Full Text]
48. Gary TL, Genkinger JM, Guallar E, Peyrot M, Brancati FL: Meta-analysis of randomized educational and behavioral interventions in type 2 diabetes. *Diabetes Educ* 29:488–501, 2003 [Abstract/Free Full Text]
49. Steed L, Cooke D, Newman S: A systematic review of psychosocial outcomes following education, self-management and psychological interventions in diabetes mellitus. *Patient Educ Couns* 51:5–15, 2003[Medline]
50. Ellis SE, Speroff T, Dittus RS, Brown A, Pichert JW, Elasy TA: Diabetes patient education: a meta-analysis and meta-regression. *Patient Educ Couns* 52:97–105, 2004[Medline]

51. Warsi A, Wang PS, LaValley MP, Avorn J, Solomon DH: Self-management education programs in chronic disease: a systematic review and methodological critique of the literature. *Arch Intern Med* 164:1641–1649, 2004[Abstract/Free Full Text]
52. Sigal RJ, Kenny GP, Wasserman DH, Castaneda-Sceppa C: Physical activity/exercise and type 2 diabetes (Technical Review). *Diabetes Care* 27:2518–2539, 2004[Free Full Text]
53. Wasserman DH, Zinman B: Exercise in individuals with IDDM. *Diabetes Care* 17:924–937, 1994 [Medline]
54. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion: *Physical Activity and Health: A Report of the Surgeon General.* Atlanta, GA, Centers for Disease Control and Prevention, 1996
55. Boulé NG, Haddad E, Kenny GP, Wells GA, Sigal RJ: Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: a meta-analysis of controlled clinical trials. *JAMA* 286:1218–1227, 2001[Abstract/Free Full Text]
56. Boulé NG, Kenny GP, Haddad E, Wells GA, Sigal RJ: Meta-analysis of the effect of structured exercise training on cardiorespiratory fitness in type 2 diabetes mellitus. *Diabetologia* 46:1071–1081, 2003[Medline]
57. Albright A, Franz M, Hornsby G, Kriska A, Marrero D, Ullrich I, Verity LS: American College of Sports Medicine position stand: exercise and type 2 diabetes. *Med Sci Sports Exerc* 32:1345–1360, 2000
58. Ivy JL: Role of exercise training in the prevention and treatment of insulin resistance and non-insulin-dependent diabetes mellitus. *Sports Med* 24:321–336, 1997[Medline]
59. Dunstan DW, Daly RM, Owen N, Jolley D, de Court, Shaw J, Zimmet P: High-intensity resistance training improves glycemic control in older patients with type 2 diabetes. *Diabetes Care* 25:1729–1736, 2002[Abstract/Free Full Text]
60. Castaneda C, Layne JE, Munoz-Orians L, Gordon PL, Walsmith J, Foldvari M, Roubenoff R, Tucker KL, Nelson ME: A randomized controlled trial of resistance exercise training to improve glycemic control in older adults with type 2 diabetes. *Diabetes Care* 25:2335–2341, 2002 [Abstract/Free Full Text]
61. Fowler-Brown A, Pignone M, Pletcher M, Tice JA, Sutton SF, Lohr KN: Exercise tolerance testing to screen for coronary heart disease: a systematic review for the technical support for the U.S. Preventive Services Task Force. *Ann Intern Med* 140:W9–W24, 2004
62. US Preventive Services Task Force: Screening for coronary heart disease: recommendation statement. *Ann Intern Med* 140:569–572, 2004[Abstract/Free Full Text]
63. Berger M, Berchtold P, Cuppers HJ, Drost H, Kley HK, Muller WA, Wiegelmann W, Zimmerman-Telschow H, Gries FA, Kruskemper HL, Zimmermann H: Metabolic and hormonal effects of muscular exercise in juvenile type diabetics. *Diabetologia* 13:355–365, 1977[Medline]
64. American Diabetes Association: Physical activity/exercise and diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S58–S62, 2004
65. Berger M: Adjustment of insulin and oral agent therapy. In *Handbook of Exercise in Diabetes.* 2nd ed. Ruderman N, Devlin JT, Schneider SH, Kriska A, Eds. Alexandria, VA, American Diabetes Association, 2002, p. 365–376
66. Aiello LP, Wong J, Cavallerano J, Bursell SE, Aiello LM: Retinopathy. In *Handbook of Exercise in Diabetes.* 2nd ed. Ruderman N, Devlin JT, Schneider SH, Kriska A, Eds. Alexandria, VA, American Diabetes Association, 2002, p. 401–413
67. Vinik A, Erbas T: Neuropathy. In *Handbook of Exercise in Diabetes.* 2nd ed. Ruderman N, Devlin JT, Schneider SH, Kriska A, Eds. Alexandria, VA, Anerican Diabetes Association, 2002, p. 463–496
68. Levin ME: The diabetic foot. In *Handbook of Exercise in Diabetes.* Ruderman N, Devlin JT, Schneider SH, Kriska A, Eds. Alexandria, VA, American Diabetes Association, 2002, p. 385–399
69. Wackers FJ, Young LH, Inzucchi SE, Chyun DA, Davey JA, Barrett EJ, Taillefer R, Wittlin SD,

Heller GV, Filipchuk N, Engel S, Ratner RE, Iskandrian AE: Detection of silent myocardial ischemia in asymptomatic diabetic subjects: the DIAD study. *Diabetes Care* 27:1954–1961, 2004 [Abstract/Free Full Text]

70. Valensi P, Sachs RN, Harfouche B, Lormeau B, Paries J, Cosson E, Paycha F, Leutenegger M, Attali JR: Predictive value of cardiac autonomic neuropathy in diabetic patients with or without silent myocardial ischemia. *Diabetes Care* 24:339–343, 2001[Abstract/Free Full Text]
71. Mogensen CE: Nephropathy. In *Handbook of Exercise in Diabetes.* 2nd ed. Ruderman N, Devlin JT, Schneider SH, Kriska A, Eds. Alexandria, VA, American Diabetes Association, 2002, p. 433–449
72. Anderson RJ, Grigsby AB, Freedland KE, de Groot M, McGill JB, Clouse RE, Lustman PJ: Anxiety and poor glycemic control: a meta-analytic review of the literature. *Int J Psychiatry Med* 32:235–247, 2002[Medline]
73. Jacobson AM: Depression and diabetes. *Diabetes Care* 16:1621–1623, 1993[Medline]
74. Lustman PJ, Griffith LS, Clouse RE, Cryer PE: Psychiatric illness in diabetes mellitus: relationship to symptoms and glucose control. *J Nerv Ment Dis* 174:736–742, 1986[Medline]
75. Rubin RR, Peyrot M: Psychosocial problems and interventions in diabetes: a review of the literature. *Diabetes Care* 15:1640–1657, 1992[Abstract]
76. Surwit RS, Schneider MS, Feinglos MN: Stress and diabetes mellitus. *Diabetes Care* 15:1413–1422, 1992[Abstract]
77. Young-Hyman D: Psycosocial factors affecting adherence, quality of life, and well-being: helping patients cope. In *Medical Management of Type 1 Diabetes.* 4th ed. Bode B, Ed. Alexandria, VA, American Diabetes Association, 2004, p. 162–182
78. Anderson BJ, Auslander WF, Jung KC, Miller JP, Santiago JV: Assessing family sharing of diabetes responsibilities. *J Pediatr Psychol* 15:477–492, 1990[Abstract/Free Full Text]
79. Clark CM Jr, Fradkin JE, Hiss RG, Lorenz RA, Vinicor F, Warren-Boulton E: The National Diabetes Education Program, changing the way diabetes is treated: comprehensive diabetes care. *Diabetes Care* 24:617–618, 2001[Free Full Text]
80. McCulloch DK, Glasgow RE, Hampson SE, Wagner E: A systematic approach to diabetes management in the post-DCCT era. *Diabetes Care* 17:765–769, 1994[Medline]
81. Rubin RR, Peyrot M: Psychological issues and treatments for people with diabetes. *J Clin Psychol* 57:457–478, 2001[Medline]
82. Marcus MD, Wing RR: Eating disorders and diabetes. In *Neuropsychological and Behavioral Aspects of Diabetes.* Holmes CS, Ed. New York, Springer-Verlag, 1990, p. 102–121
83. American Diabetes Association: Hyperglycemic crises in diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S94–S102, 2004
84. Malmberg K: Prospective randomised study of intensive insulin treatment on long term survival after acute myocardial infarction in patients with diabetes mellitus: DIGAMI (Diabetes Mellitus, Insulin Glucose Infusion in Acute Myocardial Infarction) Study Group. *BMJ* 314:1512–1515, 1997[Abstract/Free Full Text]
85. van den Berghe G, Wouters P, Weekers F, Verwaest C, Bruyninckx F, Schetz M, Vlasselaers D, Ferdinande P, Lauwers P, Bouillon R: Intensive insulin therapy in the critically ill patients. *N Engl J Med* 345:1359–1367, 2001[Abstract/Free Full Text]
86. Cryer PE: Hypoglycaemia: the limiting factor in the glycaemic management of type I and type II diabetes. *Diabetologia* 45:937–948, 2002[Medline]
87. Gannon MC, Nuttall FQ: Protein and diabetes. In *American Diabetes Association Guide to Medical Nutrition Therapy for Diabetes.* Franz MJ, Bantle JP, Eds. Alexandria, VA, American Diabetes Association, 1999, p. 107–125
88. Colquhoun AJ, Nicholson KG, Botha JL, Raymond NT: Effectiveness of influenza vaccine in reducing hospital admissions in people with diabetes. *Epidemiol Infect* 119:335–341, 1997 [Medline]
89. Bridges CB, Fukuda K, Uyeki TM, Cox NJ, Singleton JA: Prevention and control of influenza:

recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep* 51:1–31, 2002[Medline]
90. Smith SA, Poland GA: Use of influenza and pneumococcal vaccines in people with diabetes. *Diabetes Care* 23:95–108, 2000[Medline]
91. American Diabetes Association: Influenza and pneumococcal immunization in diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S111–S113, 2004
92. Arauz-Pacheco C, Parrott MA, Raskin P: The treatment of hypertension in adult patients with diabetes. *Diabetes Care* 25:134–147, 2002[Free Full Text]
93. Haffner SM: Management of dyslipidemia in adults with diabetes. *Diabetes Care* 21:160–178, 1998[Abstract]
94. Haire-Joshu D, Glasgow RE, Tibbs TL: Smoking and diabetes. *Diabetes Care* 22:1887–1898, 1999[Abstract/Free Full Text]
95. American Diabetes Asociation: Consensus development conference on the diagnosis of coronary heart disease in people with diabetes: 10–11 February 1998, Miami, Florida. *Diabetes Care* 21:1551–1559, 1998[Medline]
96. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, Jones DW, Materson BJ, Oparil S, Wright JT Jr, Roccella EJ: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA* 289:2560–2572, 2003[Abstract/Free Full Text]
97. UK Prospective Diabetes Study Group: Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. *BMJ* 317:703–713, 1998 [Abstract/Free Full Text]
98. Hansson L, Zanchetti A, Carruthers SG, Dahlof B, Elmfeldt D, Julius S, Menard J, Rahn KH, Wedel H, Westerling S: Effects of intensive blood-pressure lowering and low-dose aspirin in patients with hypertension: principal results of the Hypertension Optimal Treatment (HOT) randomised trial: HOT Study Group. *Lancet* 351:1755–1762, 1998[Medline]
99. Adler AI, Stratton IM, Neil HA, Yudkin JS, Matthews DR, Cull CA, Wright AD, Turner RC, Holman RR: Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. *BMJ* 321:412–419, 2000[Abstract/Free Full Text]
100. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R: Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. *Lancet* 360:1903–1913, 2002[Medline]
101. Stamler J, Vaccaro O, Neaton JD, Wentworth D: Diabetes, other risk factors, and 12-yr cardiovascular mortality for men screened in the Multiple Risk Factor Intervention Trial. *Diabetes Care* 16:434–444, 1993[Abstract]
102. Sacks FM, Svetkey LP, Vollmer WM, Appel LJ, Bray GA, Harsha D, Obarzanek E, Conlin PR, Miller ER III, Simons-Morton DG, Karanja N, Lin PH: Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet: DASH-Sodium Collaborative Research Group. *N Engl J Med* 344:3–10, 2001[Abstract/Free Full Text]
103. Tatti P, Pahor M, Byington RP, Di Mauro P, Guarisco R, Strollo G, Strollo F: Outcome results of the Fosinopril Versus Amlodipine Cardiovascular Events Randomized Trial (FACET) in patients with hypertension and NIDDM. *Diabetes Care* 21:597–603, 1998[Abstract]
104. Estacio RO, Jeffers BW, Hiatt WR, Biggerstaff SL, Gifford N, Schrier RW: The effect of nisoldipine as compared with enalapril on cardiovascular outcomes in patients with non-insulin-dependent diabetes and hypertension. *N Engl J Med* 338:645–652, 1998[Abstract/Free Full Text]
105. Berl T, Hunsicker LG, Lewis JB, Pfeffer MA, Porush JG, Rouleau JL, Drury PL, Esmatjes E, Hricik D, Parikh CR, Raz I, Vanhille P, Wiegmann TB, Wolfe BM, Locatelli F, Goldhaber SZ, Lewis EJ: Cardiovascular outcomes in the Irbesartan Diabetic Nephropathy Trial of patients with type 2 diabetes and overt nephropathy. *Ann Intern Med* 138:542–549, 2003 [Abstract/Free Full Text]

106. Pepine CJ, Handberg EM, Cooper-DeHoff RM, Marks RG, Kowey P, Messerli FH, Mancia G, Cangiano JL, Garcia-Barreto D, Keltai M, Erdine S, Bristol HA, Kolb HR, Bakris GL, Cohen JD, Parmley WW: A calcium antagonist vs a non-calcium antagonist hypertension treatment strategy for patients with coronary artery disease: the International Verapamil-Trandolapril Study (INVEST): a randomized controlled trial. *JAMA* 290:2805–2816, 2003[Abstract/Free Full Text]
107. Heart Outcomes Prevention Evaluation Study Investigators: Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: results of the HOPE study and MICRO-HOPE substudy. *Lancet* 355:253–259, 2000[Medline]
108. PROGRESS Collaborative Group: Randomised trial of a perindopril based blood-pressure-lowering regimen among 6,105 individuals with previous stroke or transient ischaemic attack. *Lancet* 358:1033–1041, 2001[Medline]
109. Pfeffer MA, Swedberg K, Granger CB, Held P, McMurray JJ, Michelson EL, Olofsson B, Ostergren J, Yusuf S, Pocock S: Effects of candesartan on mortality and morbidity in patients with chronic heart failure: the CHARM-Overall programme. *Lancet* 362:759–766, 2003[Medline]
110. Granger CB, McMurray JJ, Yusuf S, Held P, Michelson EL, Olofsson B, Ostergren J, Pfeffer MA, Swedberg K: Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function intolerant to angiotensin-converting-enzyme inhibitors: the CHARM-Alternative trial. *Lancet* 362:772–776, 2003[Medline]
111. McMurray JJ, Ostergren J, Swedberg K, Granger CB, Held P, Michelson EL, Olofsson B, Yusuf S, Pfeffer MA: Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function taking angiotensin-converting-enzyme inhibitors: the CHARM-Added trial. *Lancet* 362:767–771, 2003[Medline]
112. Lindholm LH, Ibsen H, Dahlof B, Devereux RB, Beevers G, de Faire U, Fyhrquist F, Julius S, Kjeldsen SE, Kristiansson K, Lederballe-Pedersen O, Nieminen MS, Omvik P, Oparil S, Wedel H, Aurup P, Edelman J, Snapinn S: Cardiovascular morbidity and mortality in patients with diabetes in the Losartan Intervention For Endpoint reduction in hypertension study (LIFE): a randomised trial against atenolol. *Lancet* 359:1004–1010, 2002[Medline]
113. ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group: Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA* 288:2981–2997, 2002 [Abstract/Free Full Text]
114. ALLHAT Collaborative Research Group: Major cardiovascular events in hypertensive patients randomized to doxazosin vs chlorthalidone: the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA* 283:1967–1975, 2000[Abstract/Free Full Text]
115. Pyorala K, Pedersen TR, Kjekshus J, Faergeman O, Olsson AG, Thorgeirsson G: Cholesterol lowering with simvastatin improves prognosis of diabetic patients with coronary heart disease: a subgroup analysis of the Scandinavian Simvastatin Survival Study (4S). *Diabetes Care* 20:614–620, 1997[Abstract]
116. Sacks FM, Pfeffer MA, Moye LA, Rouleau JL, Rutherford JD, Cole TG, Brown L, Warnica JW, Arnold JM, Wun CC, Davis BR, Braunwald E: The effect of pravastatin on coronary events after myocardial infarction in patients with average cholesterol levels: Cholesterol and Recurrent Events Trial Investigators. *N Engl J Med* 335:1001–1009, 1996[Abstract/Free Full Text]
117. The Long-Term Intervention with Pravastatin in Ischaemic Disease (LIPID) Study Group: Prevention of cardiovascular events and death with pravastatin in patients with coronary heart disease and a broad range of initial cholesterol levels. *N Engl J Med* 339:1349–1357, 1998 [Abstract/Free Full Text]
118. Heart Protection Study Collaborative Group: MRC/BHF Heart Protection Study of cholesterol-lowering with simvastatin in 5963 people with diabetes: a randomised placebo-controlled trial. *Lancet* 361:2005–2016, 2003[Medline]
119. Frick MH, Elo O, Haapa K, Heinonen OP, Heinsalmi P, Helo P, Huttunen JK, Kaitaniemi P,

Koskinen P, Manninen V, et al.: Helsinki Heart Study: primary-prevention trial with gemfibrozil in middle-aged men with dyslipidemia. Safety of treatment, changes in risk factors, and incidence of coronary heart disease. *N Engl J Med* 317:1237–1245, 1987[Abstract]

120. Rubins HB, Robins SJ, Collins D, Fye CL, Anderson JW, Elam MB, Faas FH, Linares E, Schaefer EJ, Schectman G, Wilt TJ, Wittes J: Gemfibrozil for the secondary prevention of coronary heart disease in men with low levels of high-density lipoprotein cholesterol: Veterans Affairs High-Density Lipoprotein Cholesterol Intervention Trial Study Group. *N Engl J Med* 341:410–418, 1999[Abstract/Free Full Text]
121. National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults: Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA* 285:2486–2497, 2001 [Free Full Text]
122. Grundy SM, Cleeman JI, Merz CN, Brewer HB Jr, Clark LT, Hunninghake DB, Pasternak RC, Smith SC Jr, Stone NJ: Implications of recent clinical trials for the National Cholesterol Education Program Adult Treatment Panel III guidelines. *Circulation* 110:227–239, 2004
124. Colhoun HM, Betteridge DJ, Durrington PN, Hitman GA, Neil HA, Livingstone SJ, Thomason MJ, Mackness MI, Charlton-Menys V, Fuller JH: Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARDS): multicentre randomised placebo-controlled trial. *Lancet* 364:685–696, 2004[Medline]
125. Cannon CP, Braunwald E, McCabe CH, Rader DJ, Rouleau JL, Belder R, Joyal SV, Hill KA, Pfeffer MA, Skene AM: Intensive versus moderate lipid lowering with statins after acute coronary syndromes. *N Engl J Med* 350:1495–1504, 2004[Abstract/Free Full Text]
126. de Lemos JA, Blazing MA, Wiviott SD, Lewis EF, Fox KA, White HD, Rouleau JL, Pedersen TR, Gardner LH, Mukherjee R, Ramsey KE, Palmisano J, Bilheimer DW, Pfeffer MA, Califf RM, Braunwald E: Early intensive vs a delayed conservative simvastatin strategy in patients with acute coronary syndromes: phase Z of the A to Z trial. *JAMA* 292:1307–1316, 2004 [Abstract/Free Full Text]
127. Nissen SE, Tuzcu EM, Schoenhagen P, Brown BG, Ganz P, Vogel RA, Crowe T, Howard G, Cooper CJ, Brodie B, Grines CL, DeMaria AN: Effect of intensive compared with moderate lipid-lowering therapy on progression of coronary atherosclerosis: a randomized controlled trial. *JAMA* 291:1071–1080, 2004[Abstract/Free Full Text]
128. Ballantyne CM, Grundy SM, Oberman A, Kreisberg RA, Havel RJ, Frost PH, Haffner SM: Hyperlipidemia: diagnostic and therapeutic perspectives. *J Clin Endocrinol Metab* 85:2089–2112, 2000[Free Full Text]
129. Elam MB, Hunninghake DB, Davis KB, Garg R, Johnson C, Egan D, Kostis JB, Sheps DS, Brinton EA: Effect of niacin on lipid and lipoprotein levels and glycemic control in patients with diabetes and peripheral arterial disease: the ADMIT study: a randomized trial: Arterial Disease Multiple Intervention Trial. *JAMA* 284:1263–1270, 2000[Abstract/Free Full Text]
130. Grundy SM, Vega GL, McGovern ME, Tulloch BR, Kendall DM, Fitz-Patrick D, Ganda OP, Rosenson RS, Buse JB, Robertson DD, Sheehan JP: Efficacy, safety, and tolerability of once-daily niacin for the treatment of dyslipidemia associated with type 2 diabetes: results of the Assessment of Diabetes Control and Evaluation of the Efficacy of Niaspan Trial. *Arch Intern Med* 162:1568–1576, 2002[Abstract/Free Full Text]
131. Colwell JA: Aspirin therapy in diabetes (Technical Review). *Diabetes Care* 20:1767–1771, 1997 [Medline]
132. American Diabetes Association: Aspirin therapy in diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S72–S73, 2004
133. Hayden M, Pignone M, Phillips C, Mulrow C: Aspirin for the primary prevention of cardiovascular events: a summary of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med* 136:161–172, 2002[Abstract/Free Full Text]

134. US Preventive Services Task Force: Aspirin for the primary prevention of cardiovascular events: recommendation and rationale. *Ann Intern Med* 136:157–160, 2002[Abstract/Free Full Text]
135. Bhatt DL, Marso SP, Hirsch AT, Ringleb PA, Hacke W, Topol EJ: Amplified benefit of clopidogrel versus aspirin in patients with diabetes mellitus. *Am J Cardiol* 90:625–628, 2002 [Medline]
136. American Diabetes Asociation: Smoking and diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S74–S75, 2004
137. US Preventive Services Task Force: Counseling to prevent tobacco use. In *Guide to Clinical Preventive Services.* 2nd ed. Baltimore, MD, Williams & Wilkins, 1996, p. 597–609
138. Fiore M, Bailey W, Cohen S: *Smoking Cessation: Clinical Practice Guideline Number 18.* Rockville, MD, U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, 1996
139. Garg JP, Bakris GL: Microalbuminuria: marker of vascular dysfunction, risk factor for cardiovascular disease. *Vasc Med* 7:35–43, 2002[Abstract/Free Full Text]
140. Klausen K, Borch-Johnsen K, Feldt-Rasmussen B, Jensen G, Clausen P, Scharling H, Appleyard M, Jensen JS: Very low levels of microalbuminuria are associated with increased risk of coronary heart disease and death independently of renal function, hypertension, and diabetes. *Circulation* 110:32–35, 2004
141. Gall MA, Hougaard P, Borch-Johnsen K, Parving HH: Risk factors for development of incipient and overt diabetic nephropathy in patients with non-insulin dependent diabetes mellitus: prospective, observational study. *BMJ* 314:783–788, 1997[Abstract/Free Full Text]
142. Ravid M, Lang R, Rachmani R, Lishner M: Long-term renoprotective effect of angiotensin-converting enzyme inhibition in non-insulin-dependent diabetes mellitus: a 7-year follow-up study. *Arch Intern Med* 156:286–289, 1996[Abstract]
143. Reichard P, Nilsson BY, Rosenqvist U: The effect of long-term intensified insulin treatment on the development of microvascular complications of diabetes mellitus. *N Engl J Med* 329:304–309, 1993[Abstract/Free Full Text]
144. The Diabetes Control and Complications Research Group: Effect of intensive therapy on the development and progression of diabetic nephropathy in the Diabetes Control and Complications Trial. *Kidney Int* 47:1703–1720, 1995[Medline]
145. Lewis EJ, Hunsicker LG, Bain RP, Rohde RD: The effect of angiotensin-converting-enzyme inhibition on diabetic nephropathy: the Collaborative Study Group. *N Engl J Med* 329:1456–1462, 1993[Abstract/Free Full Text]
146. Laffel LM, McGill JB, Gans DJ: The beneficial effect of angiotensin-converting enzyme inhibition with captopril on diabetic nephropathy in normotensive IDDM patients with microalbuminuria: North American Microalbuminuria Study Group. *Am J Med* 99:497–504, 1995 [Medline]
147. Bakris GL, Williams M, Dworkin L, Elliott WJ, Epstein M, Toto R, Tuttle K, Douglas J, Hsueh W, Sowers J: Preserving renal function in adults with hypertension and diabetes: a consensus approach: National Kidney Foundation Hypertension and Diabetes Executive Committees Working Group. *Am J Kidney Dis* 36:646–661, 2000[Medline]
148. Lewis EJ, Hunsicker LG, Clarke WR, Berl T, Pohl MA, Lewis JB, Ritz E, Atkins RC, Rohde R, Raz I: Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes. *N Engl J Med* 345:851–860, 2001[Abstract/Free Full Text]
149. Brenner BM, Cooper ME, de Zeeuw D, Keane WF, Mitch WE, Parving HH, Remuzzi G, Snapinn SM, Zhang Z, Shahinfar S: Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. *N Engl J Med* 345:861–869, 2001[Abstract/Free Full Text]
150. Parving HH, Lehnert H, Brochner-Mortensen J, Gomis R, Andersen S, Arner P: The effect of irbesartan on the development of diabetic nephropathy in patients with type 2 diabetes. *N Engl J Med* 345:870–878, 2001[Abstract/Free Full Text]
151. Black HR, Elliott WJ, Grandits G, Grambsch P, Lucente T, White WB, Neaton JD, Grimm RH Jr,

Hansson L, Lacourciere Y, Muller J, Sleight P, Weber MA, Williams G, Wittes J, Zanchetti A, Anders RJ: Principal results of the Controlled Onset Verapamil Investigation of Cardiovascular End Points (CONVINCE) trial. *JAMA* 289:2073–2082, 2003[Abstract/Free Full Text]

152. Pijls LT, de Vries H, Donker AJ, van Eijk JT: The effect of protein restriction on albuminuria in patients with type 2 diabetes mellitus: a randomized trial. *Nephrol Dial Transplant* 14:1445–1453, 1999[Abstract/Free Full Text]
153. Pedrini MT, Levey AS, Lau J, Chalmers TC, Wang PH: The effect of dietary protein restriction on the progression of diabetic and nondiabetic renal diseases: a meta-analysis. *Ann Intern Med* 124:627–632, 1996[Abstract/Free Full Text]
154. Hansen HP, Tauber-Lassen E, Jensen BR, Parving HH: Effect of dietary protein restriction on prognosis in patients with diabetic nephropathy. *Kidney Int* 62:220–228, 2002[Medline]
155. Kasiske BL, Lakatua JD, Ma JZ, Louis TA: A meta-analysis of the effects of dietary protein restriction on the rate of decline in renal function. *Am J Kidney Dis* 31:954–961, 1998[Medline]
156. Eknoyan G, Hostetter T, Bakris GL, Hebert L, Levey AS, Parving HH, Steffes MW, Toto R: Proteinuria and other markers of chronic kidney disease: a position statement of the national kidney foundation (NKF) and the national institute of diabetes and digestive and kidney diseases (NIDDK). *Am J Kidney Dis* 42:617–622, 2003[Medline]
157. Meigs JB, Larson MG, D'Agostino RB, Levy D, Clouse ME, Nathan DM, Wilson PW, O'Donnell CJ: Coronary artery calcification in type 2 diabetes and insulin resistance: the Framingham Offspring Study. *Diabetes Care* 25:1313–1319, 2002[Abstract/Free Full Text]
157. National Kidney Foundation: K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. *Am J Kidney Dis* 39 (2 Suppl. 1):S1–S266, 2002
158. Kramer H, Molitch ME: Screening for kidney disease in adults with diabetes. *Diabetes Care* 28:1813–1816, 2005[Free Full Text]
159. Kramer HJ, Nguyen QD, Curhan G, Hsu CY: Renal insufficiency in the absence of albuminuria and retinopathy among adults with type 2 diabetes mellitus. *JAMA* 289:3273–3277, 2003 [Abstract/Free Full Text]
160. Tsalamandris C, Allen TJ, Gilbert RE, Sinha A, Panagiotopoulos S, Cooper ME, Jerums G: Progressive decline in renal function in diabetic patients with and without albuminuria. *Diabetes* 43:649–655, 1994[Abstract]
161. Levey AS, Bosch JP, Lewis JB, Greene T, Rogers N, Roth D: A more accurate method to estimate glomerular filtration rate from serum creatinine: a new prediction equation: Modification of Diet in Renal Disease Study Group. *Ann Intern Med* 130:461–470, 1999 [Abstract/Free Full Text]
162. Levinsky NG: Specialist evaluation in chronic kidney disease: too little, too late. *Ann Intern Med* 137:542–543, 2002[Free Full Text]
163. American Diabetes Association: Nephropathy in diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S79–S83, 2004
164. Fong DS, Aiello LP, Ferris FL III, Klein R: Diabetic retinopathy. *Diabetes Care* 27:2540–2553, 2004[Free Full Text]
165. The Diabetes Control and Complications Trial Research Group: Effect of pregnancy on microvascular complications in the Diabetes Control and Complications Trial. *Diabetes Care* 23:1084–1091, 2000[Abstract/Free Full Text]
166. Vijan S, Hofer TP, Hayward RA: Cost-utility analysis of screening intervals for diabetic retinopathy in patients with type 2 diabetes mellitus. *JAMA* 283:889–896, 2000 [Abstract/Free Full Text]
167. Klein R: Screening interval for retinopathy in type 2 diabetes. *Lancet* 361:190–191, 2003 [Medline]
168. Younis N, Broadbent DM, Vora JP, Harding SP: Incidence of sight-threatening retinopathy in patients with type 2 diabetes in the Liverpool Diabetic Eye Study: a cohort study. *Lancet* 361:195–200, 2003[Medline]

169. American Diabetes Association: Retinopathy in diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S84–S87, 2004
170. Ciulla TA, Amador AG, Zinman B: Diabetic retinopathy and diabetic macular edema: pathophysiology, screening, and novel therapies. *Diabetes Care* 26:2653–2664, 2003 [Abstract/Free Full Text]
171. Boulton AJ, Vinik AI, Arezzo JC, Bril V, Feldman EL, Freeman R, Malik RA, Maser RE, Sosenko JM, Ziegler D: Diabetic neuropathies: a statement by the American Diabetes Association. *Diabetes Care* 28:956–962, 2005[Free Full Text]
172. Vinik AI, Mehrabyan A: Diabetic neuropathies (Review). *Med Clin North Am* 88:947–999, xi, 2004[Medline]
173. Vinik AI, Maser RE, Mitchell BD, Freeman R: Diabetic autonomic neuropathy. *Diabetes Care* 26:1553–1579, 2003[Abstract/Free Full Text]
174. American Diabetes Association: Peripheral arterial disease in people with diabetes (Consensus Statement). *Diabetes Care* 26:3333–3341, 2003[Free Full Text]
175. Mayfield JA, Reiber GE, Sanders LJ, Janisse D, Pogach LM: Preventive foot care in people with diabetes. *Diabetes Care* 21:2161–2177, 1998[Abstract]
176. American Diabetes Association: Preventive foot care in diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S63–S64, 2004
177. American Diabetes Association: Consensus Development Conference on Diabetic Foot Wound Care: 7–8 April 1999, Boston, Massachusetts. *Diabetes Care* 22:1354–1360, 1999[Medline]
178. Silverstein J, Klingensmith G, Copeland KC, Plotnick L, Kaufman F, Laffel L, Deeb LC, Grey M, Anderson BJ, Holzmeister LA, Clark NG, American Diabetes Association: Care of children and adolescents with type 1 diabetes mellitus: a statement of the American Diabetes Association. *Diabetes Care* 28:186–212, 2005[Free Full Text]
179. American Diabetes Association: Standards of medical care in diabetes (Position Statement). *Diabetes Care* 28:S4–S36, 2005[Free Full Text]
180. Doyle EA, Weinzimer SA, Steffen AT, Ahern JA, Vincent M, Tamborlane WV: A randomized, prospective trial comparing the efficacy of continuous subcutaneous insulin infusion with multiple daily injections using insulin glargine. *Diabetes Care* 27:1554–1558, 2004 [Abstract/Free Full Text]
181. Nimri R, Weintrob N, Benzaquen H, Ofan R, Fayman G, Phillip M: Insulin pump therapy in youth with type 1 diabetes: a retrospective paired study. *Pediatrics* 117:2126–2131, 2006 [Abstract/Free Full Text]
182. Holmes GK: Screening for coeliac disease in type 1 diabetes. *Arch Dis Child* 87:495–498, 2002 [Abstract/Free Full Text]
183. Rewers M, Liu E, Simmons J, Redondo MJ, Hoffenberg EJ: Celiac disease associated with type 1 diabetes mellitus. *Endocrinol Metab Clin North Am* 33:197–214, xi, 2004
184. American Diabetes Association: Diabetes care in the school and day care setting (Position Statement). *Diabetes Care* 30 (Suppl. 1):S66–S73, 2007
185. National Diabetes Education Program. Helping the student with diabetes succeed: a guide for school personnel [article online], 2006. Available from http://ndep.nih.gov/diabetes/pubs/Youth_NDEPSchoolGuide.pdf
186. Fagot-Campagna A, Pettitt DJ, Engelgau MM, Burrows NR, Geiss LS, Valdez R, Beckles GL, Saaddine J, Gregg EW, Williamson DF, Narayan KM: Type 2 diabetes among North American children and adolescents: an epidemiologic review and a public health perspective. *J Pediatr* 136:664–672, 2000[Medline]
187. Gahagan S, Silverstein J: Prevention and treatment of type 2 diabetes mellitus in children, with special emphasis on American Indian and Alaska Native children: American Academy of Pediatrics Committee on Native American Child Health. *Pediatrics* 112:e328, 2003 [Abstract/Free Full Text]
187. Cooper WP, Hernandez-Diaz S, Arbogast PG, Dudley JA, Dyer S, Gideon PS, Hall K, Ray WA:

Major congenital malformations after first-trimester exposure to ACE inhibitors. *N Engl J Med* 354:2443–2441, 2006[Abstract/Free Full Text]
188. Kitzmiller JL, Gavin LA, Gin GD, Jovanovic-Peterson L, Main EK, Zigrang WD: Preconception care of diabetes: glycemic control prevents congenital anomalies. *JAMA* 265:731–736, 1991 [Abstract]
189. Goldman JA, Dicker D, Feldberg D, Yeshaya A, Samuel N, Karp M: Pregnancy outcome in patients with insulin-dependent diabetes mellitus with preconceptional diabetic control: a comparative study. *Am J Obstet Gynecol* 155:293–297, 1986[Medline]
190. Rosenn B, Miodovnik M, Combs CA, Khoury J, Siddiqi TA: Pre-conception management of insulin-dependent diabetes: improvement of pregnancy outcome. *Obstet Gynecol* 77:846–849, 1991[Abstract/Free Full Text]
191. Tchobroutsky C, Vray MM, Altman JJ: Risk/benefit ratio of changing late obstetrical strategies in the management of insulin-dependent diabetic pregnancies: a comparison between 1971–1977 and 1978–1985 periods in 389 pregnancies. *Diabetes Metab* 17:287–294, 1991
192. Willhoite MB, Bennert HW Jr, Palomaki GE, Zaremba MM, Herman WH, Williams JR, Spear NH: The impact of preconception counseling on pregnancy outcomes: the experience of the Maine Diabetes in Pregnancy Program. *Diabetes Care* 16:450–455, 1993[Abstract]
193. Kitzmiller JL, Buchanan TA, Kjos S, Combs CA, Ratner RE: Pre-conception care of diabetes, congenital malformations, and spontaneous abortions. *Diabetes Care* 19:514–541, 1996[Medline]
194. American Diabetes Association: Preconception care of women with diabetes (Position Statement). *Diabetes Care* 27 (Suppl. 1):S76–S78, 2004
195. Brown AF, Mangione CM, Saliba D, Sarkisian CA: Guidelines for improving the care of the older person with diabetes mellitus. *J Am Geriatr Soc* 51:S265–S280, 2003[Medline]
196. Clement S, Braithwaite SS, Magee MF, Ahmann A, Smith EP, Schafer RG, Hirsh IB: Management of diabetes and hyperglycemia in hospitals. *Diabetes Care* 27:553–591, 2004 [Free Full Text]
197. American Association of Clinical Endocrinologists: Inpatient diabetes and metabolic control: conference proceedings. *Endocr Pract* 10 (Suppl. 2):1–108, 2004
198. Garber AJ, Moghissi ES, Bransome ED Jr, Clark NG, Clement S, Cobin RH, Furnary AP, Hirsch IB, Levy P, Roberts R, van den Berghe G, Zamudio V: American College of Endocrinology position statement on inpatient diabetes and metabolic control. *Endocr Pract* 10 (Suppl. 2):4–9, 2004
199. ACE/ADA Task Force on Inpatient Diabetes: American College of Endocrinology and American Diabetes Association Consensus Statement on Inpatient Diabetes and Glycemic Control. *Diabetes Care* 29:1955–1962, 2006[Free Full Text]
200. Centers for Disease Control and Prevention: *Hospitalizations for Diabetes as Any-Listed Diagnosis: National Diabetes Surveillance System.* Atlanta, GA, Centers for Disease Control and Prevention, 2003
201. Pomposelli JJ, Baxter JK III, Babineau TJ, Pomfret EA, Driscoll DF, Forse RA, Bistrian BR: Early postoperative glucose control predicts nosocomial infection rate in diabetic patients. *JPEN J Parenter Enteral Nutr* 22:77–81, 1998[Abstract]
202. Fritsche A, Schweitzer MA, Haring HU: Glimepiride combined with morning insulin glargine, bedtime neutral protamine hagedorn insulin, or bedtime insulin glargine in patients with type 2 diabetes: a randomized, controlled trial. *Ann Intern Med* 138:952–959, 2003 [Abstract/Free Full Text]
203. Capes SE, Hunt D, Malmberg K, Gerstein HC: Stress hyperglycaemia and increased risk of death after myocardial infarction in patients with and without diabetes: a systematic overview. *Lancet* 355:773–778, 2000[Medline]
204. Bolk J, van der PT, Cornel JH, Arnold AE, Sepers J, Umans VA: Impaired glucose metabolism predicts mortality after a myocardial infarction. *Int J Cardiol* 79:207–214, 2001[Medline]
205. Malmberg K, Ryden L, Efendic S, Herlitz J, Nicol P, Waldenstrom A, Wedel H, Welin L:

Randomized trial of insulin-glucose infusion followed by subcutaneous insulin treatment in diabetic patients with acute myocardial infarction (DIGAMI study): effects on mortality at 1 year. *J Am Coll Cardiol* 26:57–65, 1995[Abstract]

206. Malmberg K, Ryden L, Wedel H, Birkeland K, Bootsma A, Dickstein K, Efendic S, Fisher M, Hamsten A, Herlitz J, Hildebrandt P, MacLeod K, Laakso M, Torp-Pedersen C, Waldenstrom A: Intense metabolic control by means of insulin in patients with diabetes mellitus and acute myocardial infarction (DIGAMI 2): effects on mortality and morbidity. *Eur Heart J* 26:650–661, 2005[Abstract/Free Full Text]
207. Mehta SR, Yusuf S, Diaz R, Zhu J, Pais P, Xavier D, Paolasso E, Ahmed R, Xie C, Kazmi K, Tai J, Orlandini A, Pogue J, Liu L: Effect of glucose-insulin-potassium infusion on mortality in patients with acute ST-segment elevation myocardial infarction: the CREATE-ECLA randomized controlled trial. *JAMA* 293:437–446, 2005[Abstract/Free Full Text]
208. Furnary AP, Zerr KJ, Grunkemeier GL, Starr A: Continuous intravenous insulin infusion reduces the incidence of deep sternal wound infection in diabetic patients after cardiac surgical procedures. *Ann Thorac Surg* 67:352–360, 1999[Abstract/Free Full Text]
209. Furnary AP, Gao G, Grunkemeier GL, Wu Y, Zerr KJ, Bookin SO, Floten HS, Starr A: Continuous insulin infusion reduces mortality in patients with diabetes undergoing coronary artery bypass grafting. *J Thorac Cardiovasc Surg* 125:1007–1021, 2003[Abstract/Free Full Text]
210. Golden SH, Peart-Vigilance C, Kao WH, Brancati FL: Perioperative glycemic control and the risk of infectious complications in a cohort of adults with diabetes. *Diabetes Care* 22:1408–1414, 1999[Abstract/Free Full Text]
211. Zerr KJ, Furnary AP, Grunkemeier GL, Bookin S, Kanhere V, Starr A: Glucose control lowers the risk of wound infection in diabetics after open heart operations. *Ann Thorac Surg* 63:356–361, 1997[Abstract/Free Full Text]
212. van den Berghe G, Wouters PJ, Bouillon R, Weekers F, Verwaest C, Schetz M, Vlasselaers D, Ferdinande P, Lauwers P: Outcome benefit of intensive insulin therapy in the critically ill: insulin dose versus glycemic control. *Crit Care Med* 31:359–366, 2003[Medline]
213. van den Berghe G, Wilmer A, Hermans G, Meersseman W, Wouters PJ, Milants I, Van Wijngaerden E, Bobbaers H, Bouillon R: Intensive insulin therapy in the medical ICU. *N Engl J Med* 354:449–461, 2006[Abstract/Free Full Text]
214. Miller CD, Phillips LS, Ziemer DC, Gallina DL, Cook CB, El Kebbi IM: Hypoglycemia in patients with type 2 diabetes mellitus. *Arch Intern Med* 161:1653–1659, 2001 [Abstract/Free Full Text]
215. Misbin RI, Green L, Stadel BV, Gueriguian JL, Gubbi A, Fleming GA: Lactic acidosis in patients with diabetes treated with metformin. *N Engl J Med* 338:265–266, 1998[Free Full Text]
216. Misbin RI: The phantom of lactic acidosis due to metformin in patients with diabetes. *Diabetes Care* 27:1791–1793, 2004[Free Full Text]
217. Salpeter SR, Greyber E, Pasternak GA, Salpeter EE: Risk of fatal and nonfatal lactic acidosis with metformin use in type 2 diabetes mellitus: systematic review and meta-analysis. *Arch Intern Med* 163:2594–2602, 2003[Abstract/Free Full Text]
218. Pittas AG, Siegel RD, Lau J: Insulin therapy for critically ill hospitalized patients: a meta-analysis of randomized controlled trials. *Arch Intern Med* 164:2005–2011, 2004[Abstract/Free Full Text]
219. Queale WS, Seidler AJ, Brancati FL: Glycemic control and sliding scale insulin use in medical inpatients with diabetes mellitus. *Arch Intern Med* 157:545–552, 1997[Abstract]
220. Gearhart JG, Duncan JL III, Replogle WH, Forbes RC, Walley EJ: Efficacy of sliding-scale insulin therapy: a comparison with prospective regimens. *Fam Pract Res J* 14:313–322, 1994 [Medline]
221. Walts LF, Miller J, Davidson MB, Brown J: Perioperative management of diabetes mellitus. *Anesthesiology* 55:104–109, 1981[Medline]
222. Shilo S, Berezovsky S, Friedlander Y, Sonnenblick M: Hypoglycemia in hospitalized nondiabetic older patients. *J Am Geriatr Soc* 46:978–982, 1998[Medline]

223. Fischer KF, Lees JA, Newman JH: Hypoglycemia in hospitalized patients: causes and outcomes. *N Engl J Med* 315:1245–1250, 1986[Abstract]
224. Markovitz LJ, Wiechmann RJ, Harris N, Hayden V, Cooper J, Johnson G, Harelstad R, Calkins L, Braithwaite SS: Description and evaluation of a glycemic management protocol for patients with diabetes undergoing heart surgery. *Endocr Pract* 8:10–18, 2002[Medline]
225. Levetan CS, Salas JR, Wilets IF, Zumoff B: Impact of endocrine and diabetes team consultation on hospital length of stay for patients with diabetes. *Am J Med* 99:22–28, 1995[Medline]
226. Levetan CS, Passaro MD, Jablonski KA, Ratner RE: Effect of physician specialty on outcomes in diabetic ketoacidosis. *Diabetes Care* 22:1790–1795, 1999[Abstract/Free Full Text]
227. Koproski J, Pretto Z, Poretsky L: Effects of an intervention by a diabetes team in hospitalized patients with diabetes. *Diabetes Care* 20:1553–1555, 1997[Abstract]
228. Furnary AP, Braithwaite SS: Effects of outcome on in-hospital transition from intravenous insulin infusion to subcutaneous therapy. *Am J Cardiol* 98:557–564, 2006[Medline]
229. American Diabetes Association: Diabetes nutrition recommendations for health care institutions (Position Statement). *Diabetes Care* 27 (Suppl. 1):S55–S57, 2004
230. De Block C, Manuel YK, Van Gaal L, Rogiers P: Intensive insulin therapy in the intensive care unit: assessment by continuous glucose monitoring. *Diabetes Care* 29:1750–1756, 2006 [Abstract/Free Full Text]
231. American Diabetes Association: Diabetes care at diabetes camps (Position Statement). *Diabetes Care* 30 (Suppl. 1):S74–S76, 2007
232. American Diabetes Association: Diabetes management in correctional institutions (Position Statement). *Diabetes Care* 30 (Suppl. 1):S77–S84, 2007
233. American Diabetes Association: Third-party reimbursement for diabetes care, self-management education, and supplies (Position Statement). *Diabetes Care* 30 (Suppl. 1):S86–S87, 2007
234. O'Connor PJ: Electronic medical records and diabetes care improvement: are we waiting for Godot? (Editorial). *Diabetes Care* 26:942–943, 2003[Free Full Text]

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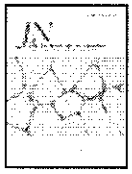

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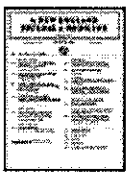

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JAMA, January 23, 2008; 299(3): 316 - 323.
[Abstract] [Full Text] [PDF]

Circulation ▸HOME

D. K. McGuire and S. E. Inzucchi
New Drugs for the Treatment of Diabetes Mellitus: Part I: Thiazolidinediones and Their Evolving Cardiovascular Implications
Circulation, January 22, 2008; 117(3): 440 - 449.
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AMERICAN JOURNAL OF HEALTH-SYSTEM PHARMACY ▸HOME

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Clinical outcomes of patients with diabetes mellitus receiving medication management by pharmacists in an urban private physician practice
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[Abstract] [Full Text] [PDF]

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[Abstract] [Full Text] [PDF]

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JAMA, December 26, 2007; 298(24): 2861 - 2863.
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Mediators of Depressive Symptoms in Children with Type 1 Diabetes and their Mothers
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S. A. Boren, T. L. Gunlock, J. Schaefer, and A. Albright
Reducing Risks in Diabetes Self-management: A Systematic Review of the Literature
The Diabetes Educator, November 1, 2007; 33(6): 1053 - 1077.
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Exercise Stress Testing in Patients With Type 2 Diabetes: When Are Asymptomatic Patients Screened?
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Clinical Diabetes ▸HOME

W. Schaffner, S. J. Rehm, and T. A. Elasy
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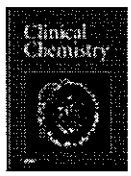

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Clinical Chemistry ▸HOME

G. Targher, G. Zoppini, G. Lippi, G. C. Guidi, and M. Muggeo
Effect of Serum Gamma-Glutamyltransferase and Obesity on the Risk of Dyslipidemia and Poor Glycemic Control in Type 2 Diabetic Patients: Cross-Sectional Findings from the Verona Diabetes Study
Clin. Chem., October 1, 2007; 53(10): 1867 - 1869.
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- If new or recurrent coronary disease is identified, options of (repeat) revascularization or other treatments (e.g., CABG, transmyocardial laser revascularization, or cardiac transplantation) should be considered.

DYSLIPIDEMIA

General Principles

- **Lowering cholesterol** levels has been shown to **decrease the risk of recurrent coronary events** and procedures in patients with coronary artery disease as well as to **prevent coronary artery disease** in people with hypercholesterolemia.
- Several studies have shown evidence of regression of atherosclerotic lesions in patients whose lipid levels are lowered.
  - Randomized placebo-controlled event trials such as the **Scandinavian Simvastatin Survival Study** showed a decrease in total as well as cardiovascular mortality in patients with coronary artery disease who had their cholesterol levels lowered with diet and drug therapy.[1]
  - In the **Cholesterol and Recurrent Events** (CARE) Study, patients with a history of myocardial infarction and baseline LDL cholesterol (LDL-C) levels of 115–175 mg/dL had a decrease in event rate when treated with cholesterol-lowering medication.[2]
  - The **West of Scotland** Study confirmed a decrease in risk of coronary events in men with elevated cholesterol levels and no previous history of myocardial infarction.[3]
  - The Air Force/Texas Coronary Atherosclerosis Prevention Study (**AFCAPS**)[4] showed the benefits of LDL lowering for primary prevention in both men and women with HDL cholesterol (HDL-C) levels <50 mg/dL. In addition, another secondary prevention trial, the Long-Term Intervention with Pravastatin in Ischemic Disease (**LIPID**)[5] study, showed decreased coronary events in patients with previous heart disease and a wide range of baseline cholesterol levels.
- More recently, studies such as the **Heart Protection Study**[6] and Pravastatin or Atorvastatin Evaluation and Infection Therapy (**PROVE-IT**)[7] study indicates that statin use at lower baseline levels of LDL or to achieve LDL levels lower than NCEP targets may be beneficial in decreasing risk in high-risk patients.

Screening and Diagnosis

- All patients with evidence of coronary disease should have lipid profiles performed. For primary prevention of cardiovascular disease, all adults over 20 should have a fasting lipoprotein profile and evaluation of cardiovascular risk factors every 5 years (Table 5-11).

TABLE 5-11 National Cholesterol Education Program Adult Treatment Panel III Guidelines: Major Risk Factors (Exclusive of Low Density Lipoprotein Cholesterol) That Modify Low Density Lipoprotein Cholesterol Goals

Cigarette smoking
Hypertension (blood pressure ≥140/90 mm Hg or on antihypertensive medication)
Family history of premature CHD (CHD in male first-degree relative <55 years; CHD in female first-degree relative <65 years)
Low HDL cholesterol (<40 mg/dL)[a]
Age: men ≥45 years women ≥55 years

CHD, coronary heart disease; HDL, high-density lipoprotein.
[a]If HDL cholesterol level is ≥60 mg/dL (1.55 mmol/L), subtract one risk factor.

- The NCEP has published guidelines for the diagnosis, evaluation, and treatment of high blood cholesterol levels in adults.[8] A recent review of clinical trials available since the Adult Treatment Panel III report was published in July 2004.[9] The paper provides updated rationale and goals for treatment of high-risk patients.
  - Lipoprotein analysis should be performed on serum obtained after a **12-hour fast.** Total cholesterol, triglycerides, and HDL-C are measured, and LDL-C is calculated using the **Friedewald formula:**

$$\text{LDL-C} = \text{total cholesterol} - \text{HDL-C} - (\text{triglycerides}/5)$$

    where triglyceride/5 represents the cholesterol contained in very-low-density lipoprotein (VLDL). This formula is not valid when triglyceride levels are >400 mg/dL. In such patients, the most reliable way to ascertain LDL-C is to measure it directly using ultracentrifugation. An immunoassay for measuring direct LDL is now widely available and can be useful in assessing LDL levels in patients with very high triglyceride levels. In patients who have had an acute MI, lipoprotein levels measured within the first 24 hours provide an approximation of their usual levels; otherwise, levels may not be stable for up to 6 weeks.
  - **Risk assessment** is the first step in the evaluation of patients. Risk is determined based on the lipoprotein profile, the presence or absence of CHD, and other major risk factors (Table 5-12).
  - **Initial classification** is based on LDL-C level, which is the primary target of therapy.
    - Optimal LDL-C is <100 mg/dL.
    - Near or above optimal LDL-C is 100–129 mg/dL.
    - Borderline-high LDL-C is 130–159 mg/dL.
    - High LDL-C is 160–189 mg/dL.
    - Very-high LDL-C is ≥190 mg/dL.
  - **Total cholesterol** and **HDL-C** classification
    - Desirable total cholesterol is <200 mg/dL.
    - Borderline-high blood cholesterol is 200–239 mg/dL.
    - High blood cholesterol is ≥240 mg/dL.
    - Low HDL-C is <40 mg/dL and is counted as a risk factor.
    - High HDL-C is ≥60 mg/dL and is a negative risk factor; its presence removes one risk factor from the total count.

TABLE 5-12 National Cholesterol Education Program Adult Treatment Panel III Guidelines: Treatment Decisions Based on LDL Cholesterol[a]

Risk category	LDL goal	LDL level at which to initiate therapeutic lifestyle changes (TLCs)	LDL level at which to consider drug therapy
CHD or CHD risk equivalents (10-yr risk >20%)	<100 mg/dL	≥100 mg/dL	≥130 mg/dL (100–129 mg/dL: drug optional)
2+ Risk factors (10-yr risk ≤20%)	<130 mg/dL	≥130 mg/dL	10-yr risk 10%–20%: ≥130 mg/dL 10-yr risk <10%: ≥160 mg/dL
0–1 Risk factor	<160 mg/dL	≥160 mg/dL	≥190 mg/dL (160–189 mg/dL: LDL-lowering drug optional)

CHD, coronary heart disease; LDL, low-density lipoprotein.
[a]Very-high-risk patients have an optional LDL goal of <70 mg/dL.

- **Risk categories** modify LDL-C goals. Patients in the category of **highest risk** are those with CAD and CAD risk equivalents. **CAD risk equivalents** include clinical CAD, carotid artery disease, peripheral vascular disease, and abdominal aortic aneurysm. Other CAD risk equivalents include diabetes mellitus and the presence of multiple risk factors that confer a 10-year risk for CAD >20% (Table 5-12).
  - **Very high risk** is defined as established vascular disease and additional conditions including multiple risk factors (especially diabetes), severe and poorly controlled risk factors (e.g., cigarette smoking), metabolic syndrome (high TG, low HDL-C), and acute coronary syndromes. These patients have an optimal LDL **goal of <70 mg/dL**. Patients with CAD and CAD risk equivalents who do not fall into the very-high-risk group have an LDL **goal of <100 mg/dL.**
  - The next category consists of patients with two or more risk factors (Table 5-11). Goal LDL for these patients is <130 mg/dL.
  - The third category consists of people with one or zero risk factors. The goal LDL for this group is <160 mg/dL.
- The **estimation of 10-year risk of CAD** is performed in patients with two or more risk factors using Framingham scoring.[8]
  - A 10-year risk of >20% is considered a CAD risk equivalent, and the goal LDL is <100 mg/dL.
  - A 10-year risk of 10%–20% qualifies the patient for a more aggressive approach than a 10-year risk of <10% even though the goal LDL is <130 mg/dL for both groups.
  - A 10-year risk of <10% usually corresponds to fewer than two risk factors.
- **Classification** of patients with CAD. Patients with CAD or CAD equivalents need aggressive therapy to lower LDL-C.
  - Optimal LDL-C is ≤100 mg/dL. These patients should have instruction on diet and physical activity. Other lipid and nonlipid risk factors should be treated. If patients have vascular disease and other conditions putting them into the very-high-risk category, consideration should be given to lipid-lowering therapy with a reduction in LDL-C to <70 mg/dL.
  - Higher than optimal LDL-C is above 130 mg/dL. Patients with baseline LDL above 130 mg/dL require intensive lifestyle therapy and maximal control of other risk factors. Drug therapy can be started simultaneously with lifestyle therapy. The goal of therapy is <100 mg/dL unless the patients are in the very-high-risk category. Patients with LDL-C levels between 100 and 129 mg/dL should have lifestyle therapy started or intensified and should be considered for initial or intensified drug therapy. The Heart Protection Study included patients with vascular disease and low LDL levels, with benefits from drug therapy shown even in patients whose baseline LDL-C levels were below 115 mg/dL.[6] When LDL-lowering medication is used, a decrease of at least 30% should be obtained.
- **Elevated serum triglyceride levels** are an independent risk factor for atherosclerotic disease. They may be associated with increased concentrations of atherogenic particles such as chylomicron remnants, VLDL remnants, and small, dense LDL particles. Patients with hypertriglyceridemia frequently have low levels of HDL-C.
  - Normal triglycerides are <150 mg/dL.
  - Borderline-high hypertriglyceridemia levels are between 150 and 199 mg/dL. Nonpharmacologic therapy, including diet, exercise, and weight loss, is the initial form of treatment in these patients. Drug therapy is considered for those who are not at goal level of LDL, which is the first target of therapy in this group of patients.
  - High triglycerides are defined as triglyceride levels between 200 and 499 mg/dL. Nonpharmacologic treatment with diet, exercise, and weight loss is initial therapy. LDL-C remains the primary target of therapy, but non-HDL-C is a secondary target. Non-HDL-C is equal to total cholesterol minus HDL. Table 5-13 shows non-HDL cholesterol goals.
  - Very high triglycerides are >500 mg/dL. These patients are at increased risk for **pancreatitis.** Nonpharmacologic measures and a search for secondary causes are needed. These patients must be treated aggressively and often require drug therapy.

TABLE 5-13 **National Cholesterol Treatment Program Adult Treatment Panel III Guidelines: Comparison of Low-Density Lipoprotein (LDL) Cholesterol and Non–High-Density Lipoprotein (HDL) Cholesterol Goals for Three Risk Categories**

Risk category	LDL goal (mg/dL) [mmol/L]	Non-HDL goal (mg/dL) [mmol/L]
CHD and CHD risk equivalent	<100 [2.56]	<130 [3.36]
Multiple (2+ risk factors)	<130 [3.36]	<160 [4.13]
0–1 Risk factor	<160 [4.13]	<190 [4.9]

CHD, coronary heart disease.

Once triglyceride levels are lowered to <500 mg/dL, LDL is again the primary target of therapy.

Specific Disorders

- **Familial hypercholesterolemia** (FH) is an autosomal-dominant disorder involving the LDL receptor.
  - **Heterozygotes** for FH have 50% of the normal number of LDL receptors, elevated LDL-C levels, and cholesterol levels of 250–500 mg/dL. The incidence is approximately 1 in 500 persons. Affected patients often have premature vascular disease and may have tendon xanthomas.
    - Treatment usually requires drug as well as diet therapy. More severe cases may require the combination of two or more medications, typically a hydroxymethylglutaryl-coenzyme A (HMG-CoA) reductase inhibitor and a bile acid sequestrant resin or cholesterol absorption inhibitor.
    - Patients with insufficient response to tolerated doses of lipid-lowering medications may be candidates for LDL apheresis.
  - **Homozygotes** for FH have few or no LDL receptors and thus have markedly elevated LDL-C levels and blood cholesterol levels of 600–1,000 mg/dL. The incidence is 1 in 1 million. Heart disease often begins in early childhood, and many patients die of heart disease in their 20s and 30s.
    - Affected children may have planar and tuberous as well as tendon xanthomas.
    - They respond poorly to both diet and drug therapy although there may be some response to higher doses of potent statins. LDL apheresis is the preferred therapy. Liver transplantation has been performed in a few patients.
- **Familial defective apolipoprotein B-100** is an autosomal dominant disorder caused by an abnormality in the LDL receptor–binding region of apolipoprotein B-100, the major protein on the surface of LDL particles. It appears to have frequency, clinical features, and lipoprotein levels similar to those of heterozygous FH.
- **Familial combined hyperlipidemia** (FCHL) is associated with an increased risk of vascular disease. Patients may have elevated cholesterol, triglycerides, or both. The molecular basis of this disorder is unknown; many patients overproduce VLDL. FCHL appears to be an autosomal-dominant disorder and occurs in 1%–2% of the population. The diagnosis is made by the presence of multiple lipoprotein phenotypes within one family.
  - Family members may have elevated VLDL, elevated LDL-C, or increased levels of both VLDL and LDL-C. HDL is often low. Many patients will have increased levels of small, dense LDLs, particles that are atherogenic.
  - Apolipoprotein B levels are frequently elevated.
  - Diet therapy, weight loss, and exercise are useful initial therapies, but many patients will require drug therapy aimed at correcting specific lipoprotein abnormalities.
- **Severe polygenic hypercholesterolemia** is found in adults whose LDL-C is above 220 mg/dL and who do not clearly demonstrate a monogenic inheritance of hypercholesterolemia. These patients are usually at increased risk for premature CHD. Many will require medication to achieve LDL-C goals.